CRT
For Ever

Dear Home Cinema Enthusiast,

We, at BARCO, have been active in Large Screen Projection for more than 20 years. We were the first to use CRT technology for high resolution graphics applications in the mid eighties; we were the first to use Amorphous Silicon LCD panels for professional projection applications in the early nineties; we were the first to break the 10K Lumen barrier with a 3-Chip DLP projector in the late nineties; we were the first to provide full color video quality LED screens for outdoor use early this century . . .

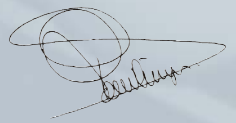
Key to this continuing success was and is, finding the right technology that best fits a specific application. The BARCO Projection engineering team – totalling three hundred and based in strategic locations throughout Europe, the US and Asia - continuously evaluates new and emerging technologies and looks for their strengths and weaknesses.

When it comes to a Home Cinema projector, and parameters such as Black Level, Dynamic Range, compatibility with a wide range of standards without scaling artifacts, the technology of choice was, is and remains CRT. Although its form factor might scare off some of the lesser passionate video enthusiasts, the true Cinephile knows there is only one choice without any compromise.

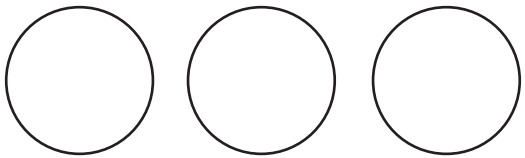
CRT is also the technology of choice for many other high end applications such as Flight Simulators, Virtual Reality Centers and 3D, . . . in which BARCO also has a leading position. This makes BARCO by far the number one manufacturer of CRT projectors worldwide and guarantees BARCO's support for this technology for many more years to come.

New technologies come and go, but some stay the best choice for a very long period. Therefore, at BARCO Home Cinema, we will continue to say:

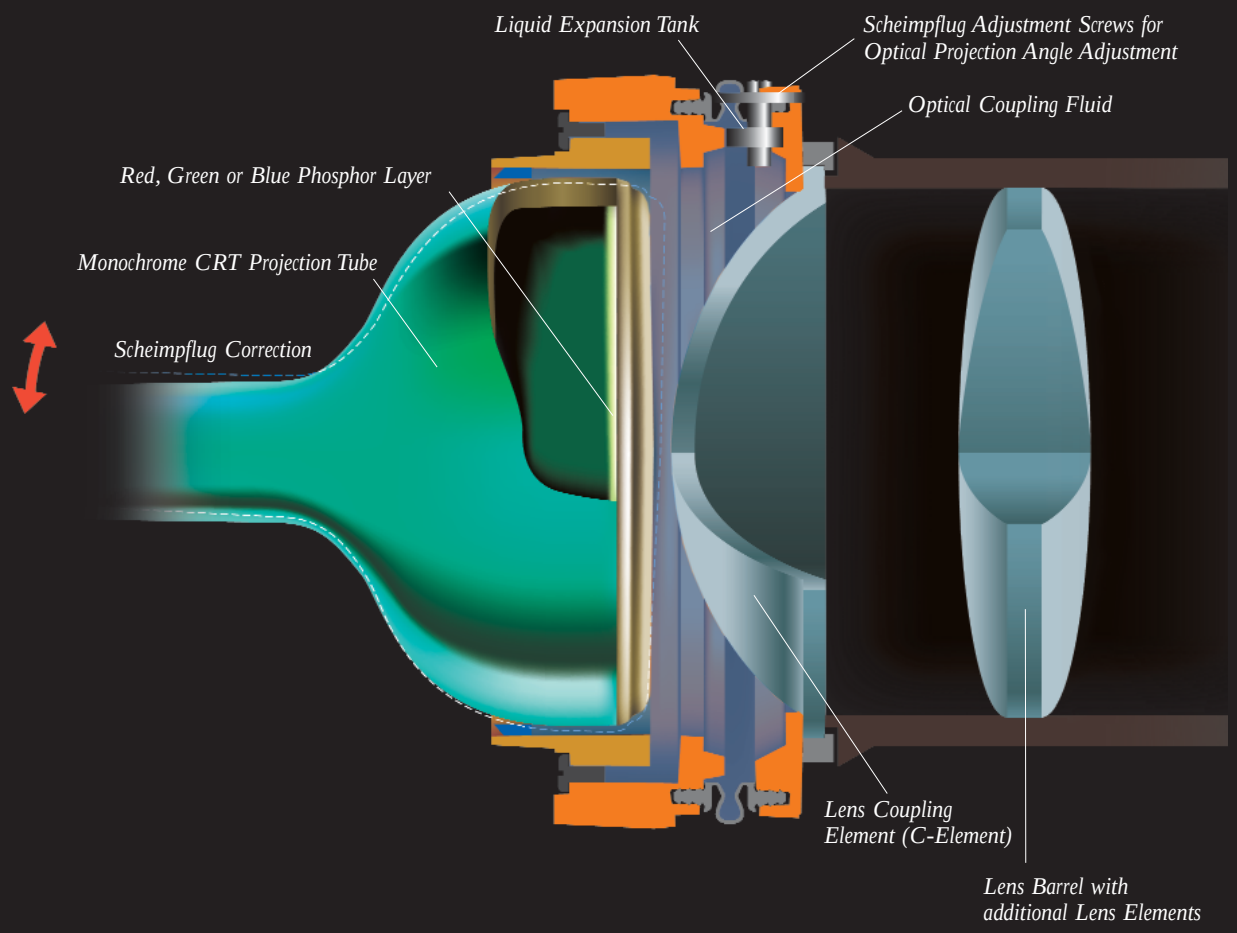
CRT For Ever !



Tom Vanthuyne
Division Manager
BARCO Home Cinema



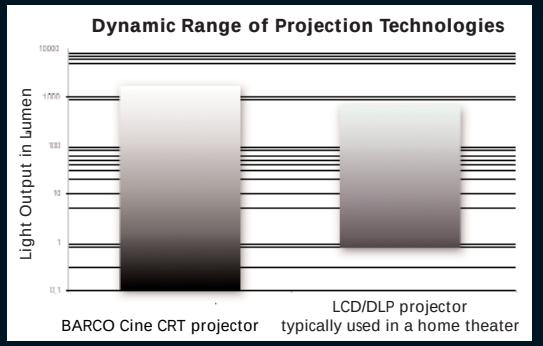
BARCO Cine CRT liquid coupled assembly with color filtered C-element for the Red picture tube.



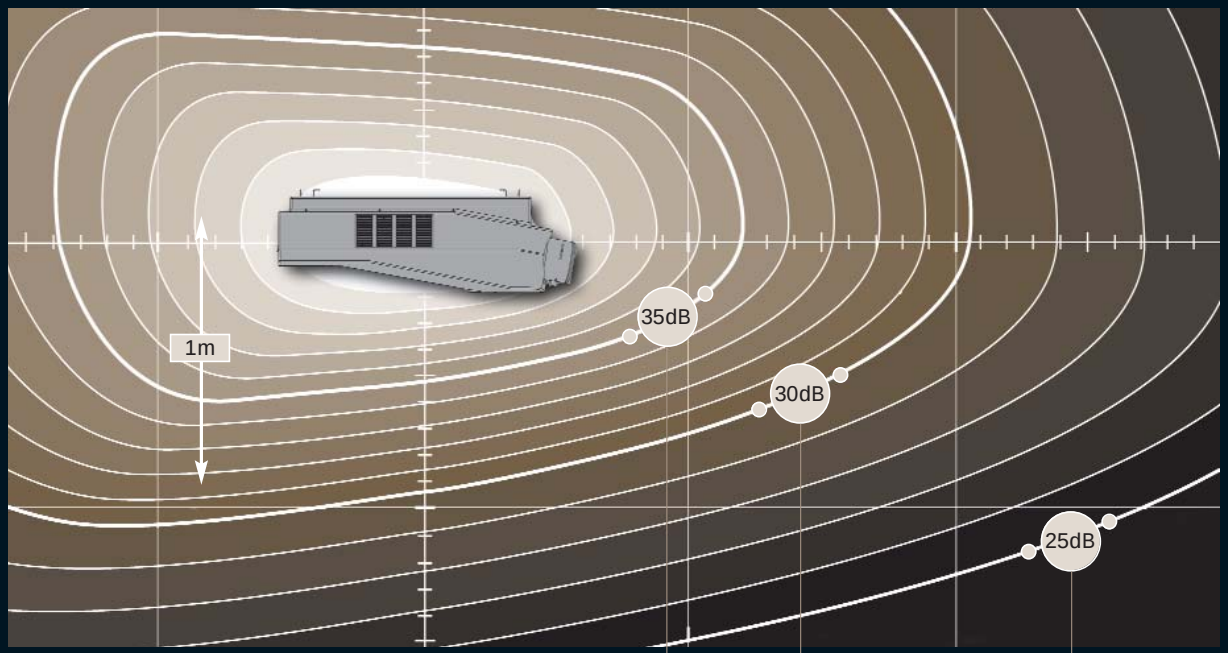
Cross Section of a liquid coupled CRT / Lens Assembly

State-of-the-Art Optical System

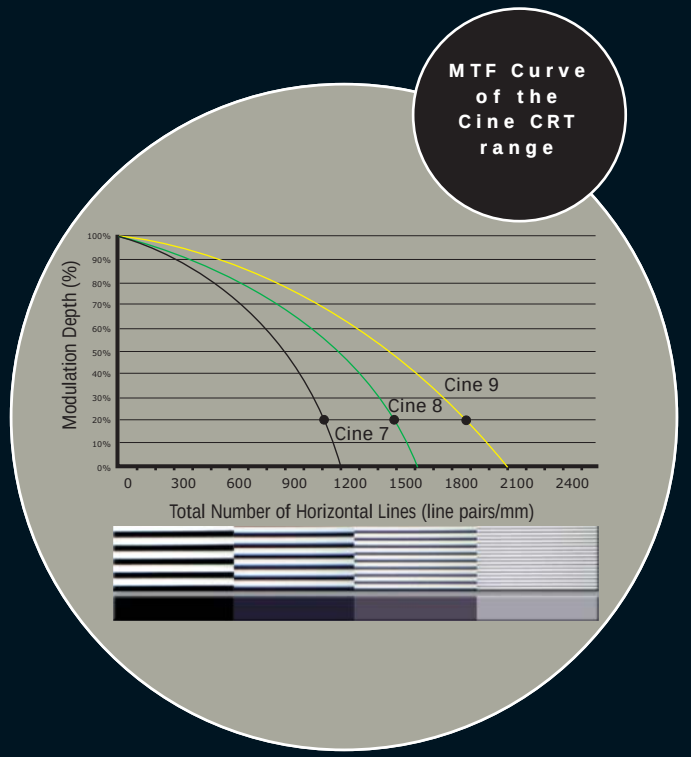
CRT technology is an emissive technology (light is emitted by the display itself), while all other currently available projection technologies are transmissive (light from a projection lamp shines on or through the image generating components). This makes CRT projectors able to display the most absolute levels of black as no extraneous light (aka light spill) washes out the black level.
Apart from an absolute black level, emissive technology and CRT technology in particular is also capable of producing a very high peak in brightness over a short period (or on a small part of the total display area), giving it an exceptional dynamic range.
As a result the liquid coupled CRT / lens assembly of the Cine 9 delivers a Contrast Ratio of over 30 000 to 1, more than 10 times the contrast ratio of even the best single lens projector available today as well as in the foreseeable future.



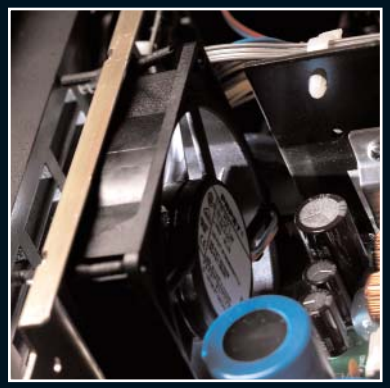
THE ULTRA-QUIET REFERENCE DISPLAY



Comparative sound level examples: quiet home | quiet whisper (at 1m/3ft) | rustling leaves



Ultra low noise fans used in the Cine CRT projectors



Ultra Low Fan Noise Level Brings Out Every Soundtrack Detail

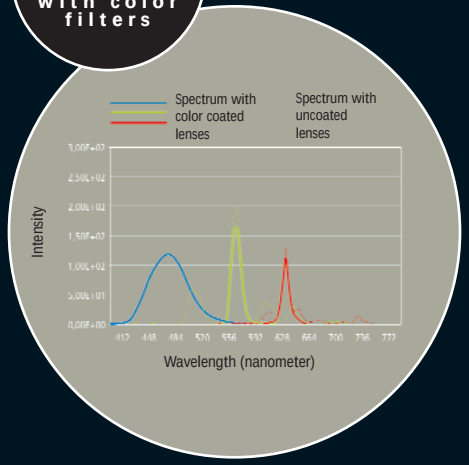
Through dedicated research & development, specially selected fans are used to keep noise levels to an absolute minimum (<30dB in typical installation at viewer's position).
Electronic compensations to reduce overall heat production are combined with internal mechanical adaptations for laminar airflow, which results in an exceptionally low noise level.
Even the smallest soundtrack details remain perfectly audible.

Ultra-high Picture Resolution

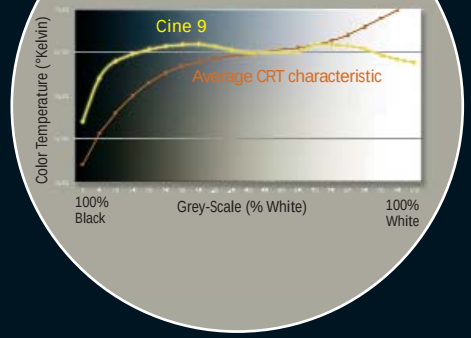
A focused electron beam generates each picture of the 3 primary color CRTs, delivering the sharpest possible image. Because of its analog nature, a CRT projector is the only type of video projection technology that is virtually transparent to the images that it displays. The projected result is a perfect reproduction of the original source material, unbroken by a modulation matrix structure (pixel structure) or colored dot patterns. It's easy to see why Hollywood filmmakers and video enthusiasts all over the world recognize CRT projectors as *the* ultimate video reproduction technology.

PERFECT NATURAL COLOR REPRODUCTION

Spectrum of Cine CRT projectors with color filters



Cine 9 Color Tracking Measurement



Accurate Color Primaries through Color Filtered and Corrected Lenses

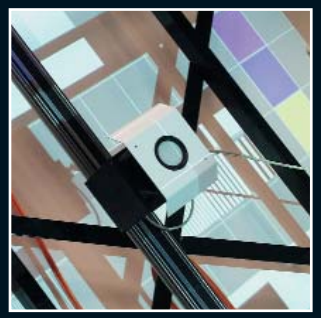
Color Correction and Color Filtering are combined on the optical components of the BARCO Cine CRT projectors to guarantee the most accurate color reproduction.

Non-Color Corrected lenses have a different magnification factor for light with different wavelengths. As the primary colors of the CRTs - even when being monochrome - consist of a range of light with different wavelengths, this results in unsharp images (Color Astigmatism). The Color Corrected lenses of the Cine CRT projectors overcome this problem and assure a closer converged projection result.

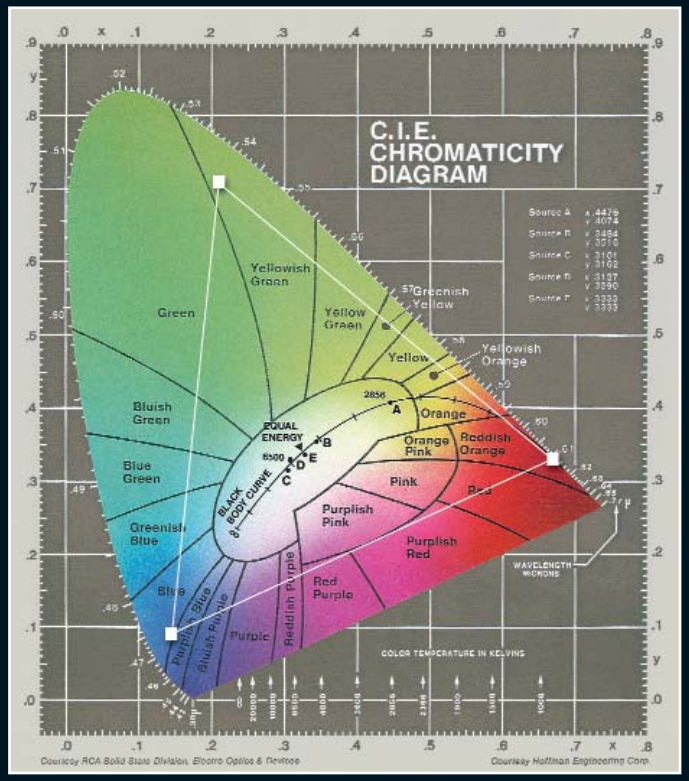
Color Filtered lenses improve the color purity and saturation of the projected image. They have a special coating that filters the light from the CRT and brings the color coordinates of the primary colors closer to the broadcast standard as prescribed by the EBU/CIE associations.

Perfect Colors through Unique Grey-Scale Tracking

To guarantee perfect color reproduction both in dark and bright scenes, the RGB amplifiers are precisely tuned to give the same result over the entire range from 0% White (Black) up to 100% White. This results in unique grey-scale uniformity.



Ultra high precision measurement used during manufactering and precalibration at the factory



The primary colors (Red, Green, Blue), projected by the CRT projectors, closely match the standards as described in the CIE chromaticity diagram by world leading broadcast associations.

INSTALLATION AND CALIBRATION

A qualified installer uses precise measurement and alignment equipment for the fine-tuning and calibration of a CRT projector installation at home.

BARCO | HOME CINEMA

CRT DEALER CERTIFICATE

All over the world, we supply our Cathode Ray Tube projection technology through a limited network of highly skilled dealers.

We hereby certify that

Mr. _____

of _____

has successfully participated in all necessary trainings on CRT projectors, and has proven his skill while doing so.

We are proud to be his partner in his assignments, and guarantee his expertise in CRT technology.

Ing. Tom Vanthuyne
BARCO Home Cinema
Division Manager

(date)

Mr. Jonathan Cooper
BARCO United Kingdom
Managing Director

Dealers carrying the BARCO CRT Dealer Certificate are trained for installation and fine tuning of CRT based projectors on a regular basis

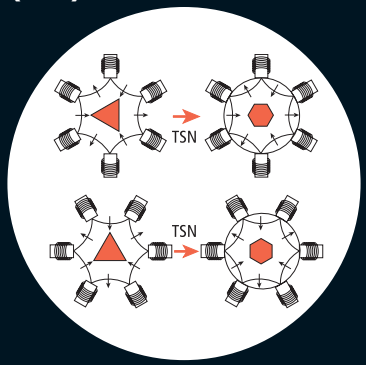
To achieve the best possible projected pictures and a long-term trouble-free operation, a precise installation and calibration by an experienced dealer or installer (e.g. an ISF trained technician) is required. BARCO only supplies its Cine CRT projection equipment through a limited network of carefully selected and highly skilled dealers all over the world. These dealers are trained to align and calibrate all the video components within the complete installation to give you a true video reference result that only a CRT projector is capable of delivering.

B
B-Y
HS/CS
VS
VIDEO

EXTREME TECHNOLOGY FOR THE PERFECT IMAGE

Larger CRT tubes result in larger phosphor surfaces and consequently increased general brightness and sharper projected images

Superb Electromagnetic Focus through Triangular Spot Nullifying™ (TSN)



Triangular beam spot (often occurring in the screen corners) turns into a perfectly round spot through TSN.

Digitally controlled 6-pole magnets offer precise electron beam correction (perfect round shape of the beam) from corner to corner, resulting in ultra sharp images across the entire screen.

CRT Projection as Large Screen Reference Display in Video Editing & Recording Studios Worldwide.

CRT projectors in general and the Cine 9 in particular are simply unbeatable in terms of color accuracy, pure black level, contrast ratio and image resolution. These and many other typical CRT projection advantages make CRT the preferred technology for use in reference displays (monitor or projector) in professional video editing and recording studios all over the world. The display quality of the Cine 9 allows video engineers to accurately evaluate the transfer and MPEG2 decoding quality of e.g. DVD sources.

Each Cine 9 is individually pre-calibrated for top performance and operationally life tested at the BARCO factory. Its unique characteristics are kept in an individual Manufacturing Identification Certificate that comes with each Cine 9. The finest measurement equipement used for our CRT projectors, built to military specifications, is used during both the manufacturing and calibration/alignment process in the factory.

SPECIFICATIONS

	Cine 7 LT / Cine 7	Cine 8	Cine 9
CRTs	7" Toshiba T180	8" Matsushita P16LXV	9" Matsushita P19LUG
Focussing System	Electrostatic	4-pole Electromagnetic	6-pole Electromagnetic (TSN)
Astigmatism	1-Zone Manual	9 Zone Digital	9 Zone Digital
Liquid Cooling	Yes	Yes	Yes
Liquid Coupling	No (Air)	No (Air)	Yes
Lenses	USPL HD145	USPL HD8	USPL HD120
F-Number	F1.18	F1.12	F1.15
Color Correction	Yes	Yes	Yes
Color Filtering	Yes	Yes	Yes
Optical Resolution (@ 50% MTF)	8lp/mm	10lp/mm	12lp/mm
Scheimpflug Correction	Discrete (washers)	Stepless	Stepless
Brightness (@ 10% peak white)	1000 Lumen	1100 Lumen	1200 Lumen
ANSI Lumens (Boost mode)	180 Lumen	220 Lumen	300 Lumen
Contrast Ratio (Full On/Off)	> 15 000 : 1	> 15 000 : 1	> 30 000 : 1

Cine 9 input board

Input Selection			
1. Video on BNC	Yes	Yes (loop through)	Yes (loop through)
2. S-Video on 4 pins mini DIN	Yes	Yes (loop through)	Yes (loop through)
2. Video on 4 pins mini DIN	-	Yes (loop through)	Yes (loop through)
3. RGsB/RGBS/RGBHV on 5 BNC	Yes	-	-
3. RGsB/RGBS/RGBHV on D9 connector	-	Yes	Yes
4. RGsB/RGBS/RGBHV with 3-Level Sync	Yes	-	-
4. RGsB/RGBS/RGBHV on 5 BNC	-	Yes	Yes
5. Component (R-Y, Y, B-Y) on 3 BNC	Yes	-	-
6. Component (R-Y, Y, B-Y) with 3-Level Sync	Yes	-	-
6. Component (R-Y, Y, B-Y) on 3 BNC	-	Yes	Yes
7. RGsB/RGBS/RGBHV with 3-Level Sync	-	Yes	Yes
8. Component (R-Y, Y, B-Y) with 3-Level Sync	-	Yes	Yes`
Gold plated BNC connectors	Yes	Yes	Yes

	Cine 7 LT / Cine 7	Cine 8	Cine 9
Optical Resolution (Shrinking Raster)	1000 TV Lines	1400 TV Lines	2000 TV Lines
Computer Compatibility @ 60Hz	up to 1024 x 768 / up to 1280 x 1024	up to 1600 x 1200	up to 2500 x 2000
Video/HD Compatibility			
480i (interlaced NTSC)	Yes	Yes	Yes*
576i (interlaced PAL/SECAM)	Yes	Yes	Yes*
480p (progressive NTSC)	Yes	Yes	Yes
576p (progressive PAL/SECAM)	Yes	Yes	Yes
1080i (HDTV)	Yes	Yes	Yes
720p (HDTV)	Yes	Yes	Yes
1080p (HDTV)	No / Yes	Yes	Yes
RGB bandwidth (-3dB)	75 MHz	120 MHz	180 MHz
Scan Frequency Range			
Horizontal	15 - 50 kHz / 15 - 69 kHz	15 - 110 kHz	15*/32 - 132 kHz
Vertical	37 - 210 Hz	37 - 210 Hz	37 - 210 H
Minimal Retrace Times			
Horizontal	4.7 µS / 3.3 µS	2.5 µS	1.8 µS
Vertical	450 µS	300 µS	300 µS
Convergence	5x5 - Zone	5x5 - Zone	9x9 - Zone
Programmable Aspect Ratio Settings	8 settings per source	8 settings per source	8 settings per source
Aspect Ratio	1.25:1 -> 2.35:1	1.25:1 -> 2.35:1	1.25:1 -> 2.35:1
Total Memory Banks	32	32	48
Internal Setup Patterns	Warm Up - Crosshatch	Warm Up - Crosshatch	Warm Up - Crosshatch
		Focus	Focus - Convergence
Color Balance Settings	3,200°K - 5,400°K - 6,500°K	3,200°K - 5,400°K - 6,500°K	3,200°K - 5,400°K - 6,500°K
	9,300°K - Custom	9,300°K - Custom	9,300°K - Custom
Screen Size (4:3)	60" to 200" Diagonal	60" to 200" Diagonal	90" to 300" Diagonal
Typical Throw Distance (4:3)	1.37 x Screen Width	1.44 X Screen Width	1.47 x Screen Width
Typical Throw Distance (16:9)	1.36 x Screen Width	1.43 x Screen Width	1.46 x Screen Width
Maximum Additional Tilt Angle	6°(@ 48 kHz) / 6°(@ 64 kHz)	12°(@ 64 kHz)	15°(@64 kHz)

LiMo Pro Board

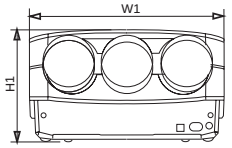
** Standard LiMo Pro video Processing Module automatically de-interlaces a 15 kHz interlaced input source*

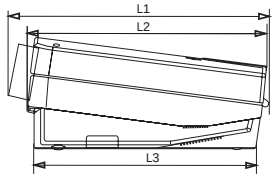
IRIS 3 Automatic Convergence and Geometry Camera

	Cine 7 LT / Cine 7	Cine 8	Cine 9
Geometric Distortion	< +/- 2%	< +/- 2%	< +/- 1%
LiMo Pro	Standard	Standard	Standard
Line Multiplier Modes	2X, 3X / 2X, 3X, 4X	2X, 3X, 4X	2X, 3X, 4X
Field Multiplier Modes	1X / 1X, 2X	1X, 2X	1X, 2X
IRIS3 (Automatic Convergence & Geometry)	Standard	Standard	Standard
Acoustic Noise Level (@ 20°C & 1m all directions)	< 35 dBA	< 32 dBA	< 32dBA
Low Noise Thermostatic Fans (DC controlled)	4	0	1
Normal Thermostatic Fans (DC Controlled)	0	2	5
Auto Diagnosis	External LED Indicators	Internal LED Indicators	On Screen Voltage and temperature diagnostics
Power Consumption (230VAC +15%/-10%)	450 W	500 W	800 W
Heath Dissipation (min. Airconditioning in enclosure)	< 1,700 BTU/hr	< 1,900 BTU/hr	< 3,000 BTU/hr
Finish	Matte Black	Matte Black	Matte Black
Gold CINE Logo	Gold Cine Logo	Gold Cine Logo	Gold Cine 9 Logo
Convergence/Focus Waveform Generation	Analog	Analog	Digital
12V trigger (e.g. screen trigger)	Yes	Yes	Yes
Backlit Remote Control / AC power cord	Yes	Yes	Yes
Safety Regulation Compliance	FCC Class B/CE/UL/CEBEC	FCC Class B/CE/UL/CEBEC	FCC Class B/CE/UL/CEBEC
Power Requirements	100 - 240 VAC / 50 - 60 Hz	100 - 240 VAC / 50 - 60 Hz	100 - 240 VAC / 50 - 60 Hz

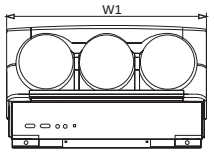
○○○| DIMENSIONS, WEIGHTS

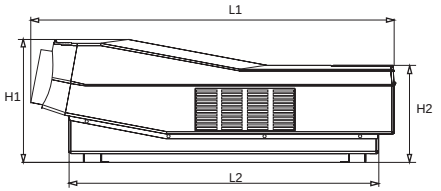
CINE 7 LT / Cine 7	inch	mm
L1	28.62	727
L2	26.34	669
L3	24.45	621
H1	11.89	302
W1	21.65	550



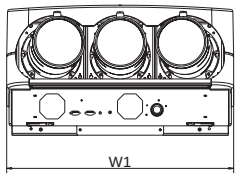


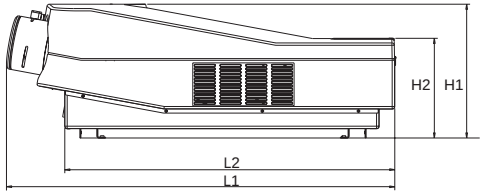
CINE 8	inch	mm
L1	42.36	1,076
L2	35.98	914
H1	14.25	362
H2	11.26	286
W1	23.23	590





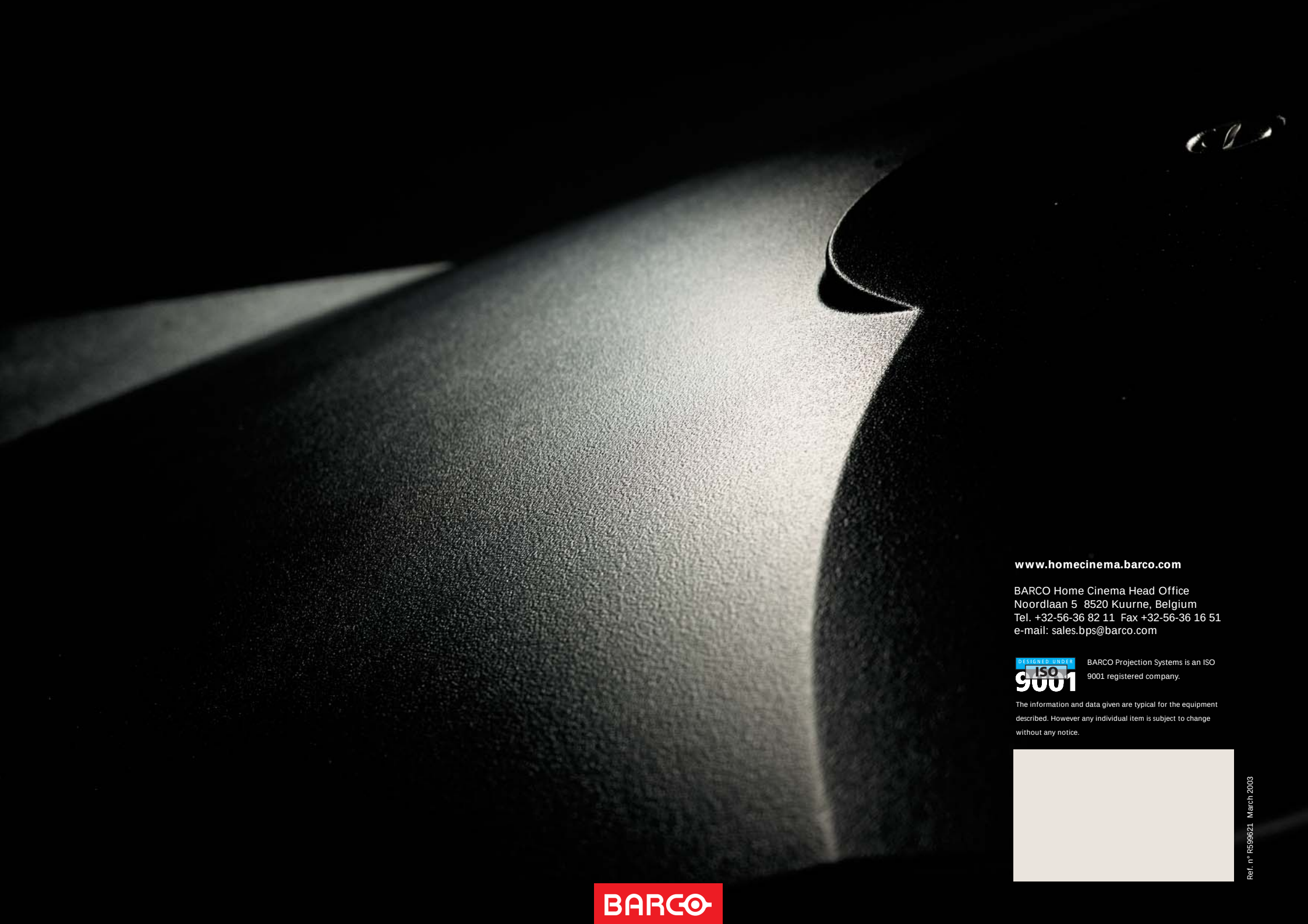
CINE 9	inch	mm
L1	44.5	1,131
L2	37.8	961
H1	15.0	390
H2	11.4	290
W1	25.6	649





	Cine 7 LT / Cine 7	Cine 8	Cine 9
Net Weight	39 kg / 84 lbs.	67 kg / 148 lbs	85 kg / 187 lbs.
Shipping Weight	56 kg / 121 lbs.	83 kg / 183 lbs.	118 kg / 260 lbs.
Volume	0,338 m^3	0,600 m^3	0,881 m^3

me



www.homecinema.barco.com

BARCO Home Cinema Head Office
Noordlaan 5 8520 Kuurne, Belgium
Tel. +32-56-36 82 11 Fax +32-56-36 16 51
e-mail: sales.bps@barco.com

BARCO Projection Systems is an ISO 9001 registered company.

The information and data given are typical for the equipment described. However any individual item is subject to change without any notice.

Ref. n° R599621 March 2003